Advancing the economics of gender

Cozzi, Guido; Francesconi, Marco; Lundberg, Shelly; Mantovan, Noemi; Sauer, Robert M

European Economic Review

Published: 01/10/2018

Peer reviewed version

Special Issue on Gender Differences: A Broad Introduction*

Guido Cozzi
University of St. Gallen
Marco Francesconi
University of Essex
Shelly Lundberg
University of California, Santa Barbara
Noemi Mantovan
Bangor University
Robert M. Sauer
Royal Holloway, University of London

May 31, 2018

Abstract

This article introduces the EER Special Issue on Gender Differences by reviewing some of the most recent facts on the topic and placing the contributions of the papers in the Special Issue in the context of a vibrant literature.

JEL Classification: J16; J31; J71
Keywords: Gender wage gap; Subject of study; University graduates; Germany

*We are grateful to all the authors who have contributed to this special issue for their truly valuable endeavor. Needless to say, we are greatly indebted to all the anonymous referees who helped us considerably in the painstaking reviewing process, and whose comments, suggestions, and insights made this possible.

1. Introduction

It is well established that, on average, women – even those with equivalent education and experience – earn less than men in all advanced societies (Bertrand 2010, Bertrand and Duflo 2017). It is also well established that, since the 1960s, the pay gap between women and men has narrowed substantially but has not disappeared. In the US, for instance, the ratio of the average (mean) full-time equivalent earnings of female workers to that of their male counterparts has increased from about 0.6 (in the period from 1960 to 1980) to approximately 0.8 in 2015 (Blau and Kahn 2017). These figures are similar to those found in the UK, Germany, Canada, the Netherlands, and Finland. For other countries, such as Australia, Belgium, France, Italy, Spain, Denmark, Norway, and Sweden, the pay gap is smaller but still favours men; while for others, such as Korea and Japan, it is much larger (see Olivetti and Petrongolo 2016). This narrowing of the gap in pay reflects the converging economic roles of men and women in the labour market, a reality that is among the most considerable social and economic advances over the last 100 years.

There are many aspects to this convergence and, equally, there are many aspects to the remaining gap. Since the influential survey by Altonji and Blank (1999), economists have offered a variety of new explanations about gender gaps. Bertrand (2010) provides an insightful review of recent contributions, drawing on advances in the psychology and experimental literatures. Her review emphasizes the importance of gender differences in risk preferences, attitudes toward competition and negotiation, and the strength of other-regarding preferences as well as the importance of social norms that may induce differential sorting of men and women across occupations. Echoing Bertrand, Goldin, and Katz (2010), Costa Dias, Joyce, and Parodi (2018) underline the role of fertility and differences in career patterns with the arrival of the first child. In another recent survey looking at a large sample of high-income countries, Olivetti and Petrongolo (2016) stress the role played by changes in the industry structure with the shift from manufacturing to services, which might have increased female employment and reduced (but not eliminated) the gender wage gap.

2. A Guided Tour of the Special Issue

This special issue covers a wide variety of topics concerning gender differentials in education, labor market performance, mental health, psychological and biological traits, crime, and the very notion of gender identity. The papers span most of the life course,

from early childhood to the end of the working life. They refer to several countries, albeit invariably to advanced economies, and use a number of different data sources and estimation techniques, from correlational studies to instrumental variable models, and from randomized control trials to structural models.

The organization of the contributions in this Special Issue is as follows. We start with a contribution that emphasizes the importance of early life interventions. García, Heckman, and Ziff (2018) estimate gender differences in life-cycle impacts across multiple domains of an influential enriched early childhood program targeted toward disadvantaged children in the United States that is evaluated by the method of random assignment (see, for instance Conti, Heckman, and Pinto [2016]). Assessing the impacts of the program on promoting or alleviating population differences in outcomes by gender, they find that, for many outcomes, boys benefit relatively more from high-quality center childcare programs compared to low-quality programs. Moreover for boys, home care, even in disadvantaged environments, is more beneficial than lower-quality center childcare. This phenomenon is not found for girls. These findings are consistent with existing evidence on the greater vulnerability of boys to adverse life conditions and on girls' greater resilience to adversity (Bertrand and Pan 2013; Kottelenberg and Lehrer 2014; Golding and Fitzgerald 2017; Schore 2017). Home environment and nonmaternal childcare, therefore, are likely to have gendered effects which should be accounted for in policy evaluations and new designs.

Interestingly, similar findings emerge in the study by Moffitt and Ribar (2018) on gender differences in food security in low-income U.S. populations. Although a long literature in economics has focused on differential allocations of resources to children within the family (Becker and Tomes 1976; Behrman, Pollak, and Taubman 1982; Cunha and Heckman 2007; Del Bono, Ermisch, and Francesconi 2012), not much is known in the case of extreme poverty and food insecurity. In a study of approximately 1,600 very disadvantaged households with children in three cities in the U.S. from 1999 to 2005, Moffitt and Ribar detect significant differences in levels of food allocation, as measured by an indicator of food "insecurity", across children of different ages and genders. Using answers to unique survey questions for a specific child in the household, food insecurity levels are much higher among older children than among younger ones, and are sometimes higher among older boys than among older girls. Allocations are strongly correlated with the dietary needs of the child as well as with household structure and the level of family organisation. However, the differences appear only in the poorest households with the

lowest levels of money income and household resources in general. Most differences disappear in significance or are greatly reduced in magnitude when resources rise to only modest levels.

Both these results and those of the previous study emphasize the relevance of family behaviors in the evolution of child success, not only at the very beginning of life but also in later childhood (Ermisch and Francesconi 2001; Björklund, Ginther and Sundström 2007; Amato 2010). This points to the importance of the family environment, which is the focus of the work by Brenøe and Lundberg (2018). They provide evidence on the effects of family disadvantage on educational attainment and subsequent labour market outcomes of men and women. Using data for the entire Danish population born between 1966 and 1995, Brenøe and Lundberg explore the effects of parental education and family structure on siblings' current and future performance. Their analysis shows that maternal education has stronger impact on the educational attainment and employment of daughters relative to sons'. On the other hand, paternal education decreases the gender gap in educational attainment, thus favouring sons, while at the same time having a stronger effect on daughters' future earnings. This work provides evidence that goes beyond the narrative that skill development in boys is more sensitive to family background than in girls, and documents that maternal education and family structure have a moderating effect on school behavioural problems, which are more common among boys. As in the case of the already mentioned Moffitt-Ribar paper, these behaviour gaps seem to be short-lived and do not affect significantly the long-term skill acquisition by gender.

A natural step forward over the life cycle is to see more directly whether gender differences emerge in human capital formation and whether these have consequences in the early careers of men and women. To this purpose, the Special Issue offers three related studies on highly skilled (university educated) individuals from three different countries.

The first of these three studies is by Francesconi and Parey (2018), who explore the effect of human capital accumulation on the gender wage gap among university graduates in Germany using both administrative data and survey data about college graduates from all fields of studies between 1989 and 2009. A number of findings emerge, some of which are close to what others have found for other countries (e.g., Goldin and Katz 2008 and 2016; Fortin, Oreopoulos, and Phipps 2015; Olivetti and Petrongolo 2016), and some of which are new. Since the mid-1990s, roughly equal numbers of men and women enrol in higher education programmes. Conditional on having completed college, women enter

university with better secondary school marks. At the end of their university career, more women than men obtain a degree. This is consistent with differential dropout rates by gender, which might have consequences for the cohorts of male and female graduates entering the labour market. There is some persistent educational specialisation by gender, with substantially more men in STEM subjects and more women in arts and humanities, although this segregation has lessened in recent years. Female graduates do not outperform male graduates in terms of final exit marks. The difference reveals a better performance among male graduates. This is clearer at the top of the final university grade distribution. The reversal of relative performance at the end as opposed to the start of the university career is a new result. This might reect the greater dropout rate among men but also other factors (such as men achieving maturity and catching up with women in terms of academic skills, or universities offering programs that are better suited to men's than to women's abilities), which deserve more research in the future. On the pay gap, their results confirm what has been found for the population at large in many other countries. Twelve to 18 months after graduation, the raw (unadjusted) gender gap in full-time monthly earnings is about 20 log points on average, even though male and female full-timers work relatively similar hours. Including a large set of controls reduces (but does not eliminate) the gap to 5–10 log points, with the lion's share of the reduction being accounted for by eld of study at university. There is heterogeneity in the magnitude of the gender pay gap by eld of study, with the largest differentials emerging among graduates from economics/business and STEM subjects. Once the full set of controls is taken into account, the remaining wage gap is about 8 log points across all available cohorts. As mentioned, within-firm career opportunities (such as 'inability to ask' or promotions) and family-related choices (such as children) are likely to be less relevant for men and women soon after their college graduation than later in life.

The second paper in this group of studies is by Albrecht, Bronson, Thoursie and Vroman (2018) on the career dynamics of highly skilled men and women in Sweden, in the footsteps of earlier work by, among others, Wood, Corcoran, and Courant (1993) and Bertrand, Goldin, and Katz (2010). In this paper, they use matched worker-firm register data from Sweden to track wages for up to 20 years among women and men born in the years 1960–1970 who completed a university degree in business or economics. Unlike their German counterparts as found in the previous study, these women and men have similar wages and earnings at the start of their careers, but their career paths diverge substantially as they age. They also display substantial differences in wage paths

associated with becoming a parent. Looking at whether firm effects account for the differences observed between women's and men's wage profiles, Albrecht and colleagues document differences between the firms where men work and those where women work. A wage decomposition, however, suggests that such differences in firm characteristics play only a small role in explaining the gender log wage gap among workers. An important new step in this study is to examine whether gender differences in firm-to-firm mobility help explain the patterns in wages observed in the data. Men and women both exhibit greater mobility early in their careers, but there is little gender difference in this firm-to-firm mobility. Instead, the main driver of the gender difference in log wage profiles is that men experience higher wage gains than women do both as "switchers" and as "stayers". Re-emphasizing some of the conclusions highlighted by Card, Cardoso and Kline (2016), this result points to the importance of the match between workers and firms as well as the gendered role of job turnover, especially in the early part of workers' careers.

Related to some the findings from the previous work is the last study in this block by Bütikofer, Jensen, and Salvanes (2018). This focuses on the role played by parenthood on the gender gap among top earners in Norway. The slant of this perspective is shared with other recent contributions, including Angelov, Johansson, and Lindhal (2016) and Kleven, Landais, and Søgaard (2018), as well as with that of older structural studies that concentrate more on female behaviour, such as Moffitt (1984), Hotz and Miller (1988), and Francesconi (2002). The specific question addressed in this work is whether the wage penalty due to motherhood is larger among highly qualified women. Bütikofer and colleagues study the effect of parenthood on the careers of high-achieving women relative to high-achieving men in a set of high-earning professions with either nonlinear or linear wage structures (see Goldin and Katz 2016). Using Norwegian registry data, this paper documents that the child earnings penalty for mothers in professions with a nonlinear wage structure (such MBAs and lawyers) is substantially larger than for mothers in professions with a linear wage structure. The gender earnings gap for MBA and law graduates is around 30%, but substantially less for STEM and medicine graduates, even 10 years after childbirth. In addition, descriptive statistics on the role of fertility timing on the child earnings penalty emphasise that parents with MBA or law degrees appear to be more sensitive to the timing of fertility and career orientation as compared to parents with STEM or medical degrees.

That fertility timing is crucial to career development and sex-related differences in

earnings growth is not new (Gronau 1973; Weiss and Gronau 1981; Mincer and Ofek 1982). But some new development on this issue is offered in the work by provided by Buddelmeyer, Hamermesh, and Wooden (2018) who investigate the time and financial burden perceived by parents following the birth of a child. To this they also add the analysis of the burden perceived when children leave their parental home. The model of this study identifies time and financial stress as the Lagrange multipliers on a household's time and good constraints, respectively. Using household panel data collected between 2001 and 2012 in Australia and between 2002 and 2012 in Germany, Buddelmeyer and colleagues estimate the Lagrange multipliers for time and good constraints. A number of important gender differences between mothers and fathers are uncovered, which add to what we know already from other studies, including Aguiar and Hurst (2007) and Guryan, Hurst, and Kearney (2008). In particular, they find that a birth leads to a substantial rise in mothers' time stress that does not disappear over the first few years of their child's life. The increase in fathers' time stress is instead much smaller. There is also some (weak) evidence that a birth increases spouses' financial stress, with weak evidence that this increase is greater among wives than husbands. On the other hand, the departure of a child from home reduces parents' financial stress, with the effect being larger for mothers than fathers, but the reduction in time stress is substantially lower in absolute value than the increase in time stress following a birth.

Clearly many other (parental) decisions beside children may affect gender differentials or may have gendered implications. One such decision pertains to marriage itself, as underlined in earlier work by, among others, Pijoan-Mas and Ríos-Rull (2014) and Van den Berg and Gupta (2015). Using data from the Panel Study of Income Dynamics and the Medical Expenditure Panel Survey, Guner, Kulikova, and Llull (2018) explore exactly this domain analyzing the health gap between married and unmarried individuals of working-age. Controlling for observables, they find a gap that peaks at 10 percentage points at ages 55–59 years. The marriage health gap is similar for men and women. Allowing for unobserved heterogeneity in innate health (permanent and age-dependent), which is potentially correlated to the timing and likelihood of marriage, Guner and colleagues find that the effect of marriage on health disappears below age 40 years, while about 5 percentage points difference between married and unmarried individuals remains at older ages (55-59 years). This suggests that the observed gap is mainly driven by selection into marriage at younger ages, but there might be a protective effect of marriage at older ages. Exploring the mechanisms behind this result, it emerges that

better innate health is associated with a higher probability of marriage and a lower probability of divorce, and there is strong assortative mating among couples by innate health. Married individuals are also more likely to have healthier behaviour compared to unmarried ones. Interestingly, health insurance is critical for the materialisation of the beneficial effect of marriage.

More generally, we could imagine that in forming their marriages or household units, men and women consider both their individual time allocation decisions and their public good production (such as children). This is the framework used and developed in Flinn, Todd, and Zhang (2018), which builds on the work by Del Boca and Flinn (2012). Todd and colleagues focus on how personality traits affect household time and resource allocation decisions and wages. In their model, households choose between two distinct behavioural modes, namely, cooperative or noncooperative. Spouses receive wage offers and allocate time to supplying labor market hours and to producing a public good. Personality traits, measured by the "Big Five" traits (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism), can affect household bargaining weights and wage offers. Model parameters are structurally estimated by simulated method of moments using the Household Income and Labor Dynamics in Australia (HILDA) data. Personality traits are found to be important determinants of household bargaining weights and of wage offers and to have substantial implications for understanding the sources of gender wage disparities. In particular, males receive a positive return for being conscientious and a negative return for being agreeable. For women, instead, the individual personality traits are not statistically significant but they are jointly significant. Overall, the effect of personality traits on the wage equation is comparable to the effect of education and potential work experience. These results confirm the increasing recognition that non-cognitive traits play an important role in explaining a variety of outcomes related to education, earnings, and health (e.g., Heckman and Raut 2016).

As mentioned in the Introduction, the importance of personality traits and other non-economic factors in explaining gender gaps has been increasingly underlined in recent research (see among others Bertrand [2010] and Bertrand and Duflo [2017]). In addition to the previous paper, another contribution to this Special Issue in the same non-economic domain is the paper by Guiso and Rustichini (2018). Their interest is in understanding why a smaller fraction of leadership positions is occupied by women in virtually all professions. Their starting point is that the ratio of second-to-fourth-digit (2D4D ratio) can be shown to correlate negatively with entrepreneurial skills and

financial success, as argued in a number of earlier studies (e.g., Manning et al. 1998; Coates, Gurnell, and Rustichini 2009; Sapienza, Zingales, and Maestripieri 2009). Using a sample of Italian entrepreneurs, Guiso and Rustichini document that women have a lower 2D4D ratio than men, in sharp contrast with features of the distribution in a random sample. Exploiting variation across communities in indices correlated with women emancipation, it is shown that in areas where women are less emancipated their average 2D4D ratio is lower than that of men compared to areas with higher indices. This finding is consistent with the existence of intrinsic gender related obstacles into management so that only women with well above average managerial skills find it attractive to self-select into entrepreneurship or managerial careers. Together these results help us explain why fewer women than men are managers, why the proportion of women among managers is higher in countries (or areas) with higher female emancipation, and why female managers display more 'masculine' traits. Interestingly, conditional on having entered managerial positions, men and women are equally able. These results complement the findings illustrated earlier from the papers by Albrecht et al. (2018), Bütikofer, Jensen, and Salvanes (2018), and Francesconi and Parey (2018). They also add to the literature that emphasises the key role played by firms in fostering gender differentials (Card, Cardoso, and Kline 2016).

Guiso and Rustichini's findings are consistent with the results often found in the literature that, on average, women are more likely to avoid competition, underperform in competitive environments, and exhibit higher risk aversion than men. Besides the 2D4D ratio hypothesis, another explanation of this relates to the idea that the gender of one's opposition could influence competitive behaviour (see for instance Gneezy, Niederle, and Rustichini [2003], Booth and Nolen [2012], and Booth, Cardona-Sosa, and Nolen [2014]). Jetter and Walker (2018) analyse a rich database of *Jeopardy!* episodes with a large number of contestants to study whether the gender of one's opponents affects behaviour in a highly competitive situation with high stakes. As contestants are unable to choose the gender of their opponents, *Jeopardy!* provides an attractive field experiment to explore such dynamics. Contrary to existing studies, Jetter and Walker find that a woman is more likely to win and competes more aggressively when paired against males. Moreover, the otherwise robust gender gap in risk-taking disappears once a woman competes in an all-male field of competitors. These results are robust to the inclusion of a rich list of potentially confounding variables and player fixed effects. These results seem not to be driven by a strategic consideration of women performing more aggressively because

of a potential under-performance in particularly high-stakes situations. From the male perspective, performance indicators turn out to be less responsive to their opponents' gender, but a notable heterogeneity emerges for wagering decisions. In particular, a man wagers significantly less when competing against women. This evidence is consistent with adaptation to gendered social norms in competitive environments. The findings that women compete more aggressively and risk more when in the company of males and that men may risk less when competing against women give a different and new nuance to the analysis of gender gaps.

Besides education, work, careers, fertility and marital decisions, biological and psychological traits, and preferences, another context in which gender differential are likely to emerge is mental health. This domain, which is related to the previously mentioned work by Guner and colleagues, is the focus of the study by Cozzi, Galli, and Mantovan (2018). This is the first paper to provide a theoretical and empirical analysis of the effects of psychotherapy on individual productivity. It formulates a model in which the deterioration of mental health endogenously causes a decrease in productivity that can be offset by psychotherapy treatment. Cozzi and colleagues test their hypotheses using data on men and women from the British Household Panel Survey and employing individual fixed-effects. They find that consulting a psychotherapist has a positive impact on income, and that the impact is larger for men than for women. In particular, men can expect to gain about 12% higher wages from psychotherapy, while for women the expected wage gain varies between 8% and 10%. Men seek help from psychotherapists less often even though they would gain more than women, with women benefitting between 18% and 36% less than men. Consulting a psychotherapist accounts for about 2.5% of the part of the gender gap that would be left unexplained and associated with discrimination otherwise. Mental health has recently become more prominent in the policy agenda of many advanced societies (see, for instance, World Health Organization [2013] and Parkin and Powell [2017]). Some of the issues emphasised in recent studies refer precisely to the fact that mental illness often goes untreated and that treatment options and resources for mental health compare unfavourably with those for physical conditions.

Differently from mental health, an aspect that instead has been very high on the policy agenda worldwide is crime. Although much is known about its determinants and possible remedies (e.g., Draca and Machin 2015), we know very little of the gender gradient in crime. This Special Issue breaks new ground in this respect by offering two

papers on this specific topic. The first is by Beatton, Kidd, and Machin (2018) which sheds light on the problem looking at the case of Australia using rich administrative data on the population of young people in Queensland. There is evidence of a significant narrowing of the gender gap in criminal activity over the course of the last twenty years. Crime convergence occurs for broad aggregates of both property and violent crime, as well as for almost all sub-component categories. Convergence occurs largely because crime has fallen significantly for men, combined with much less of a downward trend for women. This is confirmed by aggregate analysis of rates of offending in police force districts matched to Census data by gender between 2001 and 2016. It should be noted that these patterns coincide with the introduction of Queensland's Earning or Learning reform which reduced offending by more for male youth (because of their lower education levels before the reform was enacted) vis a vis females. In a world in which there is a considerable progress in (legal) economic and social status for women, a possible explanation for the gender crime convergence is that the returns to crime for men have fallen sharply, while those for women, which have been traditionally low, have remained fairly stable.

This is strongly confirmed by the second paper on the same issue by Campaniello and Gavrilova (2018) who explore gender disparities in crime participation in the United States. Using data from the U.S. National Incident Based Reporting System on property crimes from 1995 to 2015, this work documents that there is a gender crime participation gap, with only 30 percent of the crimes being committed by females. The focus here is on finding possible explanations of this gap by concentrating on incentives to commit crime, such as criminal earnings and probability of arrest. Campaniello and Gavrilova show that on average females earn 13% less than comparable males while they face a 9% lower likelihood of arrest. Males respond more to changes in illegal earnings, with an elasticity of 0.36, while females are less responsive with an elasticity of 0.23. Both sexes respond equally to changes in the probability of arrest, with an elasticity of about 0.14. From decomposition analysis, it turns out that differences in incentives explain approximately 8% of the gender participation gap, while differences in responsiveness to changes in incentives, especially illegal earnings, explain about 56% of the gap. The fact that females behave differently than males has implications for the heterogeneity in response to crime control policies. Drawing from the economic analysis of socially constructed identities (Akerlof and Kranton 2000), one conjecture is that stereotypes can play a role in the participation decision. If crime is perceived as a masculine job,

entering females would de-value the masculinity image and may thus be ostracised by their male counterparts. This would imply females are less likely to enter into criminal activities.

Some of the contributions previously reviewed emphasise the salience of gendered (job-to-job) mobility which can determine pay differentials between men and women (see, for instance, Albrecht et al. 2018). The paper by Brussevich (2018) extends this idea to look at the role played by sectoral mobility in the United States coupled with the growing importance of trade liberalisation. The background of this argument is that, since the early 1990s, American manufacturing employment has declined by about one-third, with losses in male employment and wages representing the largest share of this decline because manufacturing industries that intensively employ men have suffered the most from import competition (Autor and Dorn 2013; Autor, Dorn, and Hanson 2013). In her work, Brussevich presents a dynamic model of intersectoral labor mobility to explore the effects of import competition on gender wage differentials. In the model there are two forces driving for the reduction in the gender wage gap: heterogeneous mobility costs and the different proportion of men and women employed in the manufacturing and service sectors. The model is structurally estimated using data from the Occupational Information Network database and the Current Population Survey and finds that entry costs across sectors vary substantially according to the origin sector. There are sizeable gender differences in mobility costs, with women facing higher barriers to entering the manufacturing, construction, and transportation sectors and maleto s facing higher barriers entering the service sector. Using trade shock simulations, Brussevich shows that because manufacturing mostly employs men, a shock affecting imports in the manufacturing sector would affect more male employment and wages. As a result, gains from trade, both in terms of wages and welfare, are higher for women than for men.

The Special Issue closes with the study by Geijtenbeek and Plug (2018), which goes at the heart of the already mentioned problem of gender identity (see Beatton, Kidd, and Machin 2018, and Campaniello and Gavrilova 2018). This paper looks at gender identity from the perspective of transsexual workers, and asks the question whether there is a penalty for registered women and a premium for registered men. Using a large administrative sample of Dutch workers, Geijtenbeek and Plug examine the labor market outcomes of transsexual workers before and after their administrative gender transition. This study both provides information about the labor market performance of an LGBT minority and also offers an alternative mechanism for measuring gender effects. It finds

that, before transition female-to-male transsexual (FTM) workers have earnings similar to non-transsexual women, and male-to-female transsexual (MTF) workers have earnings similar to non-transsexual male workers. After transition, MTF workers (but not FTM workers) earn less, and this penalty holds for both annual and hourly earnings. The paper considers two possible channels for these earnings changes, one due to the gender change itself and the other to transition costs due to discrimination against transsexuals or medical complications, and finds that these channels account for earnings penalties of 10 and 7 percent respectively. Thus, the transition penalty offsets the possible earnings gains of FTM workers and exacerbates the earnings losses of MTF workers as registered women.

3. Where Do We Stand?

Women's economic progress over the twentieth century has been remarkable, with male-female convergence occurring in a myriad of dimensions. We have witnessed considerable change in parenting practices, social norms, and intrahousehold resource allocations that have led to greater gender equality. More recently, we have observed a rapid catch up and, in many cases, even a reversal in human capital acquisition and schooling achievement at all levels of education. We have seen a substantial improvement in female labor market participation and in the way in which women are rewarded in the labor market as compared to their male counterparts. Some catching up has happened also in negative dimensions, such as participation in criminal activities. Many of such experiences are documented in this Special Issue.

In spite of this success, however, this Special Issue uncovers a number of areas where gender differences remain a concern, and as such many questions remain open. Just to mention a few freshly unearthed areas and open questions, we emphasize that:

(a) Early family circumstances are crucial. Low quality non-maternal childcare seems to have a more deleterious impact on boys' development than girls', and so does extreme poverty. Maternal and paternal inputs also have gendered consequences on child development. Early policy interventions will have to find a balance across all those dimensions between the sexes and their success therefore will in part depend on our improved understanding of such effects.

(b) In the production of high quality skills, a salient role is played by universities which seem to reproduce (perhaps even magnify) gender differences rather than

level them out. As post-secondary education institutions worldwide critically look at their programmes in terms of the challenges posed by new technologies and pressing labor market demands, what are the possibilities for further addressing gender imbalances in university related choices, given for instance the strong link between field of study and labor market opportunities?

(c) Labor market prospects, even for the highly skilled and at the start of the career, are likely to be gender biased. Men and women's opportunities are also differently affected by macroeconomic conditions and exposure to international trade flows. How can firms be put in a position to allow greater flexibility to their workforce without compromising career prospects? For instance, what makes temporal flexibility, which might benefit women in specific professional careers, difficult to achieve? More specifically, how can we achieve linearity in hours worked and pay?

(d) Many factors contribute to inflate gender differentials in pay and living conditions. Besides the well-known possibility of career interruptions related to children, marriage itself may generate a gradient in health, which differs between men and women. Is it a question of selection? Or can information offer a nudge?

(e) Time allocation decisions also have crucial implications for efficient marriages. Psychological (non-cognitive) traits are found to have important determinants of household bargaining. Likewise, mental health has a gendered dimension which is important for public policy as well as for firm management. Genetic endowments can affect key choices, but the interaction between genes and environment seems to be equally crucial to shape preferences and attitudes to competition and risk. Can these attitudes be effectively trained from early ages?

(f) There has been a significant narrowing of the gender gap in criminal activity, although some substantial differences still persist. Gender differences here may reflect perceptions of gender identity. This is not just relevant in crime participation, and thus in the design of crime control policies, but also in the labor market, where employers and employees may have norms and (possibly biased) views of tasks that are gender specific. How deep and widespread are these views? Do they occur in education too?

Despite the large coverage of the Special Issue, a number of important domains are not explored. These include gender differences in primary and secondary schools (both

between students and between students and teachers), in later life (work and retirement, health, and intergenerational links), in the direct role played by firms in hiring, firing, and promotions, and in leadership in companies and government. Filling out these other areas makes for a rather compelling research agenda for the future.

The last 100 years has witnessed a significant gender convergence in almost all life domains. The next step is to understand where we still fall short of full convergence. After having seen women's phenomenal gains in education and work experience, the next step concerns the utilisation and remuneration of specific productive attributes. Special attention will have to focus on how firms respond to changes in technology and to the evolving constraints of workers as family and work issues arise. This is not just about women. Gender inequality is not a zero-sum game. Policy makers, educators, employers, and shareholders will all benefit if we can find the societal and economic conditions that generate convergence in pay between the sexes.

References

Aguiar, Mark, and Erik Hurst. 2007. "Measuring Trends in Leisure: The Allocation of Time Over Five Decades." *Quarterly Journal of Economics*, 122(3): 969–1006.

Akerlof, George A., Rachel E. Kranton, 2000. "Economics and Identity." *Quarterly Journal of Economics*, 115(3): 715–753.

Albrecht, James, Mary Ann Bronson, Peter Skogman Thoursiey, and Susan Vroman. 2018. "The Career Dynamics of High-Skilled Women and Men: Evidence from Sweden." *European Economic Review*, this issue.

Altonji, Joseph G., and Rebecca Blank. 1999. "Race and Gender in the Labor Market", in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics*, volume 3C, pp. 3144–3259. Amsterdam: Elsevier.

Amato, Paul R. 2010. "Research on Divorce: Continuing Trends and New Developments." *Journal of Marriage and Family*, 72(3): 650–666.

Angelov, Nikolay, Per Johansson, and Erica Lindahl. 2016. "Parenthood and the Gender Gap in Pay." *Journal of Labor Economics*, 34(3): 545–579.

Autor, David H., and D. Dorn. 2013. "The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market." *American Economic Review*, 103(5): 1553–1597.

Autor, David H., David Dorn, and Gordon H. Hanson. 2013. "The China Syndrome: Local Labor Market Effects of Import Competition in the United States." *American Economic Review*, 103(6): 2121–2168.

Beatton, Tony, Michael P. Kidd, and Stephen Machin. 2108. "Gender Crime Convergence over Twenty Years: Evidence from Australia." *European Economic Review*, this issue.

Becker, Gary S., and Nigel Tomes. 1976. "Child Endowments and the Quantity and Quality of Children." *Journal of Political Economy*, 84(3, pt. 2): S143–S162.

Behrman, Jere, Robert A. Pollak, and Paul Taubman. 1982. "Parental Preferences and Provision for Progeny." *Journal of Political Economy* 90(1): 52–73.

Bertrand, Marianne. 2010. "New Perspectives on Gender", in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics*, volume 4B, pp. 1545–1592. Amsterdam: Elsevier.

Bertrand, Marianne, and Esther Duflo, 2017. "Field Experiments on Discrimination." In Abhijit Banerjee and Esther Duflo eds., *Handbook of Field Experiments*, vol. 1, forthcoming.

Bertrand, Marianne, Claudia Goldin, and Lawrence F. Katz. 2010. "Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sectors." *American Economic Journal: Applied Economics*, 2(3): 228–255.

Bertrand, Marianne, and Jessica Pan. 2013. "The Trouble with Boys: Social Influences and the Gender Gap in Disruptive Behavior." *American Economic Journal: Applied Economics*, 5(1): 32–64.

Björklund, Anders, Donna K. Ginther, and Marianne Sundström. 2007. "Family Structure and Child Outcomes in the USA and Sweden." *Journal of Population Economics*, 20(1): 183–201.

Blau, Francine D., and Lawrence M. Kahn. 2016. "The Gender Wage Gap: Extent, Trends, and Explanations." IZA Discussion Paper No. 9656, *Journal of Economic Literature*, forthcoming.

Booth, Alison, Lina Cardona-Sosa, and Patrick Nolen. 2014. "Gender Differences in Risk Aversion: Do Single-Sex Environments Affect Their Development?" *Journal of Economic Behavior and Organization*, 99(1): 126–154.

Booth, Alison, and Patrick Nolen. 2012. "Choosing To Compete: How Different Are Girls and Boys?" *Journal of Economic Behavior and Organization*, 81(2): 542–555.

Brenøe, Anne A., and Shelly Lundberg. 2018. "Gender Gaps in the Effects of Childhood Family Environment: Do They Persist into Adulthood?" *European Economic Review*, this issue.

Brussevich, Mariya. 2018. "Does Trade Liberalization Narrow the Gender Wage Gap? The Role of Sectoral Mobility." *European Economic Review*, this issue.

Buddelmeyer, Hielke, Daniel Hamermesh, and Mark Wooden. 2018. "The Stress Cost of Children on Moms and Dads." *European Economic Review*, this issue.

Bütikofer, Aline, Sissel Jensen, and Kjell G. Salvanes. 2017. "What Explains the Gender Gap among Top Earners." *European Economic Review*, this issue.

Card, David, Ana Rute Cardoso, and Patrick Kline. 2016. "Bargaining, Sorting, and the Gender Wage Gap: Quantifying the Impact of Firms on the Relative Pay of Women." *Quarterly Journal of Economics*, 131(2): 633–686.

Coates, John M., Mark Gurnell, and Aldo Rustichini. 2009. "Second to fourth digit ratio predicts success among high-frequency financial traders." *Proceedings of the National*

Academy of Sciences, 106(2): 623–628.

Conti, Gabriella, James J. Heckman, and Rodrigo Pinto. 2016. "The Effects of Two Influential Early Childhood Interventions on Health and Healthy Behaviours." *Economic Journal*, 126(596), F28–F65.

Costa Dias, Monica, Robert Joyce, and Francesca Parodi. 2018. "The Gender Pay Gap in the UK: Children and Experience in Work." IFS Working Paper 18/02.

Cozzi, Guido, Silvia Galli, and Noemi Mantovan. 2018. "Will a Shrink Make you Richer? Gender Differences in the Effects of Psychotherapy on Labour Efficiency." *European Economic Review*, this issue.

Cunha, Flavio, and James J. Heckman. 2007. "The Technology of Skill Formation." *American Economic Review*, 97(2): 31–47.

Del Boca, Daniela, and Christopher J. Flinn. 2012. "Endogenous Household Interaction." *Journal of Econometrics*, 166(1): 49–65.

Del Bono, Emilia, John Ermisch, and Marco Francesconi. 2012. "Intrafamily Resource Allocations: A Dynamic Structural Model of Birthweight." *Journal of Labor Economics*, 30(3): 657–706.

Draca, Mirko, and Stephen Machin. 2015. "Crime and Economic Incentives." *Annual Review of Economics*, 7: 389–408.

Ermisch, John, and Marco Francesconi. 2001. "Family Structure and Children's Achievements." *Journal of Population Economics*, 14(2): 249–270.

Flinn, Christopher J., Petra E. Todd, and Weling Zhang. 2018. "Personality Traits, Intra-household Allocation and the Gender Wage Gap." *European Economic Review*, this issue.

Fortin, Nicole M., Philip Oreopoulos, and Shelley Phipps. 2015. "Leaving Boys Behind: Gender Disparities in High Academic Achievement." *Journal of Human Resources*, 50(3): 549–579.

Francesconi, Marco. 2002. "A Joint Dynamic Model of Fertility and Work of Married Women." *Journal of Labor Economics*, 20(2, pt. 1): 336–380.

Francesconi, Marco, and Matthias Parey. 2018. "Early Gender Gaps Among University Graduates." *European Economic Review*, this issue.

García, Jorge L., James Heckman, and Anna L Ziff. 2018. "Gender Differences in the Benefits of an Influential Early Childhood Program." *European Economic Review*, this issue.

Geijtenbeek, Lydia, and Erik Plug. 2018. "Is There a Penalty for Registered Women? Is There a Premium for Registered Men? Evidence from a Sample of Transsexual Workers?" *European Economic Review*, this issue.

Gneezy, Uri, Muriel Niederle, and Aldo Rustichini. 2003. "Performance in Competitive Environments: Gender Differences." *Quarterly Journal of Economics*, 118(3): 1049–1074.

Goldin Claudia, Lawrence F. Katz. 2008. "Transitions: Career and Family Lifecycles of the Educational Elite." *American Economic Review*, 98(2): 363–369.

Goldin Claudia, Lawrence F. Katz. 2016. "A Most Egalitarian Profession: Pharmacy and the Evolution of a Family Friendly Occupation." *Journal of Labor Economics*, 34(3): 705–746.

Golding, Paul, and Hiram E. Fitzgerald. 2017. " Psychology of Boys at Risk: Indicators from 05." *Infant Mental Health Journal*, 38(1): 5–14.

Gronau, Reuben. 1973. "The Effects of Children on the Housewife's Value of Time." *Journal of Political Economy*, 81(2, pt. 2): S168–S199.

Guiso, Luigi and Aldo Rustichini. 2018. "What Drives Women Out of Management? The Joint Role of Testosterone and Culture." *European Economic Review*, this issue.

Guner, Nezih, Yuliya Kulikova, and Joan Llull. 2018. "Marriage and Health: Selection, Protection, and Assortative Mating." *European Economic Review*, this issue.

Guryan, Jonathan Erik Hurst, and Melissa Kearney. 2008. "Parental Education and Parental Time with Children." *Journal of Economic Perspectives*, 22(3): 23–46.

Heckman, James J., and Lakshmi K. Raut. 2016. "Intergenerational Long-Term Effects of Preschool: Structural Estimates from a Discrete Dynamic Programming Model." *Journal of Econometrics*, 191(1): 164–175.

Hotz, V. Joseph, and Miller, Robert A. 1988. "An Empirical Analysis of Life Cycle Fertility and Female Labor Supply." *Econometrica*, 56(1): 91–118.

Jetter, Michael, and Jay K. Walker. 2018. "The Gender of Opponents: Explaining Gender Differences in Performance and Risk-Taking." *European Economic Review*, this issue.

Kleven, Henrik, Camille Landais, and Jakob Egholt Søgaard. 2018. "Children and Gender Inequality: Evidence from Denmark." NBER Working Paper No. 24219, January.

Kottelenberg, Michael J., and Steven F. Lehrer. 2014. "The Gender Effects of Universal Child Care in Canada: Much Ado About Boys." Unpublished manuscript, Department of Economics, Queen's University.

Manning John T., Diane Scutt, J. Wilson, and D. Iwan Lewis-Jones. 1998. "The Ratio of 2nd to 4th Digit Length: A Predictor of Sperm Numbers and Concentrations of Testosterone, Luteinizing Hormone and Oestrogen." *Human Reproduction*, 13(11): 3000–3004.

Mincer, Jacob, and Ofek, Haim. 1982. "Interrupted Work Careers." *Journal of Human Resources*, 17(1): 3–24.

Moffitt, Robert A. 1984. "Profiles of Fertility, Labour Supply, and Wages of Married Women: A Complete Life-Cycle Model." *Review of Economic Studies*, 51(2): 263–78.

Moffitt, Robert A., and David Ribar. 2018. "Child Age and Gender Differences in Food Security in a Low-Income U.S. Inner-City Population." *European Economic Review*, this issue.

Olivetti, Claudia, and Barbara Petrongolo. 2016. "The Evolution of Gender Gaps in Industrialized Countries." *Annual Review of Economics*, 8: 405–434.

Parkin, Elisabeth, and Thomas Powell. 2017. *Mental Health Policy in England.* House

of Commons Library, Briefing Paper Number CBP 07527, August.

Pijoan-Mas, Josep, and José-Víctor Ríos-Rull. 2014. "Heterogeneity in Expected Longevities." *Demography*, 51(6): 2075–2102.

Sapienza, Paola, Luigi Zingales, and Dario Maestripieri. 2009. "Gender Differences in Financial Risk Aversion and Career Choices Are Affected by Testosterone." *Proceeding of the National Academy of Sciences*, 106(36): 15268–15273.

Schore, Allan N. 2017. "All Our Sons: The Developmental Neurobiology and Neuroendocrinology of Boys at Risk." *Infant Mental Health Journal*, 38(1): 15–52.

Van den Berg, Gerard J., and Sumedha Gupta. 2015. "The Role of Marriage in the Causal Pathway from Economic Conditions Early in Life to Mortality." *Journal of Health Economics*, 40(1): 141–158.

Weiss, Yoram, and Reuben Gronau. 1981. "Expected Interruptions in Labour Force Participation and Sex-Related Differences in Earnings Growth." *Review of Economic Studies*, 48(4): 607–619.

Wood, Robert G., Mary E. Corcoran and Paul N. Courant. 1993. "Pay Differences Among the Highly Paid: The Male-Female Earnings Gap in Lawyers' Salaries." *Journal of Labor Economics*, 11(3): 417–441.

World Health Organization. 2013. *Mental Health Action Plan 2013–2020.* WHO: Geneva.